

# RESERVE COPY

## PATENT SPECIFICATION



Application Date: Sept. 20, 1930. No. 28,124/30.

356,497

Complete Left: June 18, 1931.

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### PROVISIONAL SPECIFICATION.

#### Improvements in or relating to Crank-shaft Mechanism for Bicycles.

I, ERNEST ARNOLD RADNALL, a Subject of the King of Great Britain, of Vauxhall Works, Dartmouth Street, Birmingham, in the County of Warwick, do hereby declare the nature of this invention to be as follows:—

This invention relates to the manufacture of crank-shaft mechanism for bicycles, the invention relating to the manufacture of the mechanism which includes a crank-axle or shaft having a pair of cranks mounted thereon, with one of which is usually associated a sprocket wheel. The object of the present invention is to reduce the cost of manufacture of such mechanism.

According to one part of the present invention, the crank-shaft is made from round bar material and on to one end of this shaft is driven a collar having at one end a laterally projecting annular flange for receiving the sprocket wheel and having at the other end a reduced portion for receiving the crank.

According to a further part of the present invention, the sprocket wheel is secured upon the collar by placing it over the laterally projecting annular flange, the outer surface or periphery of which may be serrated, and then applying a force upon the end surface of the flange which may be recessed to form a concavity, the said force being applied axially and operating to expand the edge portion of the flange so that it engages the inner side of the sprocket wheel which has been placed thereon. The crank which is adjacent the sprocket wheel is driven on to the reduced end of the collar.

According to a further feature of the present invention, the collar carrying the sprocket wheel and crank is secured to the crank-shaft by a brazing operation, the melted brass being run along the surface

of the crank-shaft between the collar and the crank-shaft and also running over the end surface of the crank-shaft and collar so as to secure the crank in position.

A further part of the present invention relates to an improved method of securing the second crank, and according to this part of my invention, this end of the crank shaft is machined or otherwise treated so that a pair of flats are formed thereon, these flats preferably being oppositely disposed and the end of the crank-shaft is also drilled or machined to provide a central slot, thus leaving a pair of endwise projecting portions of arcuate form. The crank is slotted, the slot having parallel sides and ends of arcuate form. This crank is placed over the end of the crank-shaft where the flats are provided and the two endwise projecting portions of the crank-shaft project beyond the outer side of the crank. Over these projecting portions a slotted washer is placed, the washer having two slots corresponding in shape with the sectional shape of the projecting portions of the crank-shaft. After the washer is in position, the projecting portions of the crank-shaft are rivetted or expanded so that all the parts of the crank mechanism are then locked together.

The crank-shaft intermediate its two ends may be provided with peripheral grooves for oiling purposes and the whole structure may be suitably plated or finished.

Dated the 18th day of September, 1930.

FORRESTER, KETLEY & Co.,

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### COMPLETE SPECIFICATION.

#### Improvements in or relating to Crank-shaft Mechanism for Bicycles.

I, ERNEST ARNOLD RADNALL, a Subject of the King of Great Britain, of Vauxhall Works, Dartmouth Street, Birmingham,

in the County of Warwick, do hereby declare the nature of this invention and in what manner the same is to be performed.

to be particularly described and ascertained in and by the following statement:—

This invention relates to the manufacture of crank-shaft mechanism for bicycles, the invention relating to the manufacture of the mechanism which includes a crank-axle or shaft having a pair of cranks mounted thereon, with one of which is usually associated a sprocket wheel. The object of the present invention is to reduce the cost of manufacture of such mechanism and generally to improve the construction thereof.

According to this invention I provide crank-shaft mechanism for bicycles, wherein a crank is secured to the crank-shaft by providing the latter with a flat or flats and spaced longitudinal projections, mounting the crank non-rotatably on the flat or flats of the crank-shaft by threading it over the projections and subsequently expanding the projections at their outer ends to fix the crank to the crank-shaft.

According to a further feature of this invention, an end of the crank-shaft is machined or otherwise treated so that a pair of flats are formed thereon, these flats preferably being oppositely disposed, and the end of the crank-shaft is also drilled or machined to provide a central slot, thus leaving a pair of endwise projecting portions of arcuate form. The crank is slotted, the slot having parallel sides and ends of arcuate form. This crank is placed over the end of the crank-shaft where the flats are provided and the two endwise projecting portions of the crank-shaft project beyond the outer side of the crank. Over these projecting portions a slotted washer is placed, the washer having two slots corresponding in shape with the sectional shape of the projecting portions of the crank-shaft. After the washer is in position, the projecting portions of the crank-shaft are riveted or expanded so that all the parts of the crank mechanism are then locked together.

According to a further feature of the invention a sprocket and an adjacent crank is secured on the crank-shaft by a collar adapted to be driven on to the crank-shaft and reduced at one end to receive the crank and having an annular flange or tubular extension for receiving the sprocket wheel and adapted to be expanded to secure the sprocket wheel thereon.

The crank-shaft intermediate its two ends may be provided with peripheral grooves for oiling purposes and the whole structure may be suitably plated or finished.

In order that my invention may be

clearly understood and more readily carried into practice, I have appended hereunto one sheet of drawings, illustrating the same, wherein:—

Figure 1 is a part sectional elevation of a crank-shaft mechanism constructed according to this invention.

Figure 2 is a part sectional end elevation of the same.

Figure 3 is a part perspective and part sectional view showing the various parts of the crank-shaft mechanism illustrated in Figure 1 before assembly.

Referring to the drawings, 1 is the crank-shaft which comprises a suitable length of round metal bar provided between its ends with a series of peripheral oiling grooves 2. The bar 1 is provided at one end 3 with diametrically opposite flats 4 and on this end of the shaft is driven a collar 5 having a reduced end 6 and an annular flange 7 at its other end, the flange 7 being formed by reducing the collar in diameter and removing some of the metal from the inside 8 of the collar.

The flange 7 is provided on its outer surface with serrations 9 which preferably are parallel to the axis of the collar.

The collar 5 is mounted on the bar 1 with the flange 7 remote from the end 3 of the shaft and on the flange 7 is driven a sprocket wheel 10 having an axial hole 11 to receive the flange 7. After the wheel 10 has been placed on the flange 7 so that it abuts the shoulder 12 of the collar 5, the inner end of the flange 7 is subjected to pressure applied axially and is forced outwardly on to the inside of the sprocket wheel 10 substantially as shown in Figure 1 so as to fasten securely the sprocket wheel on the collar 5.

On the reduced end 6 of the collar 5 is driven a crank 13 and the inner surface of this crank abuts the opposite side of the shoulder 12 of the collar 5 to that abutted by the wheel 10.

After the wheel 10, crank 13, collar 5 and bar 1 have been assembled as described, they are secured permanently together by a brazing operation, the molten material being run along the surface of the crank-shaft 1 between the collar 5 and the crank-shaft and also over the end surfaces of the crank-shaft and collar.

The other end of the crank-shaft 1, i.e. the end opposite to that at which the wheel 10 and crank 13 are mounted, is axially drilled at 14 for a short distance and is provided with external opposite flats 15, and in this way a pair of arcuate diametrically opposite spaced projections 16 are provided on this end of the crank-shaft.

A crank 17 is provided and this crank

has an aperture 18 at its inner end provided with flat parallel sides 19 and arcuate ends, and the distance between the flats of this aperture is approximately the same as the distance between the flats 15 on the shaft 1, whilst the radii of the arcuate ends of the slot 18 are approximately the same as the radius of the shaft 1.

10 The crank 17 is placed on the flats 15 of the crank-shaft 1 by passing the latter through the slot 18 in the crank and then a washer or disc 20, having a pair of diametrically opposite arcuate spaced slots 15 21 which correspond in shape and position with the projections 16 on the crank-shaft 1, is placed on the projections 16 and the latter are then forced, by the application of mechanical pressure, outwardly on to 20 the outer surface of the disc 20 so driving the crank 17 up to shoulders 22 at the inner ends of the flats 15 on the crank-shaft and securing the crank permanently upon the crank-shaft 1. The flats 15 prevent relative rotational movement between 25 the crank-shaft 1 and the crank 17.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is 30 to be performed, I declare that what I claim is:—

1. Crank-shaft mechanism for bicycles, wherein a crank is secured to the crank-shaft by providing the latter with a flat 35 or flats and spaced longitudinal projections, mounting the crank non-rotatably on the flat or flats of the crank-shaft by threading it over the projections, and subsequently expanding the projections at 40 their outer ends to fix the crank to the crank-shaft.

2. Crank-shaft mechanism according to Claim 1, wherein a washer apertured to receive said projections is threaded on the latter after the crank and is trapped 45 between the latter and the out-turned parts of the projections.

3. Crank-shaft mechanism according to Claim 1 or 2, wherein the crank-shaft is provided with flats at the projection end 50 and the aperture of the crank mounted on this end of the crank-shaft is similarly provided with flats so that when the parts are assembled relative rotation of the crank and crank-shaft is prevented. 55

4. For securing a sprocket and crank on crank-shaft mechanism according to Claims 1, 2 or 3, a collar adapted to be driven on to the crank-shaft and reduced at one end to receive the crank and having 60 an annular flange or tubular extension for receiving the sprocket wheel and adapted to be expanded to secure the sprocket wheel thereon.

5. Crank-shaft mechanism according to Claim 4, wherein the crank-shaft, collar, crank, and sprocket are all brazed 65 together.

6. Crank-shaft mechanism according to either Claims 4 or 5, wherein the said 70 flange or tubular extension of the said collar is provided with a serrated surface.

7. Crank-shaft mechanism substantially as herein described and as illustrated in the annexed drawings. 75

Dated the 12th day of June, 1931.

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FIG. 2.

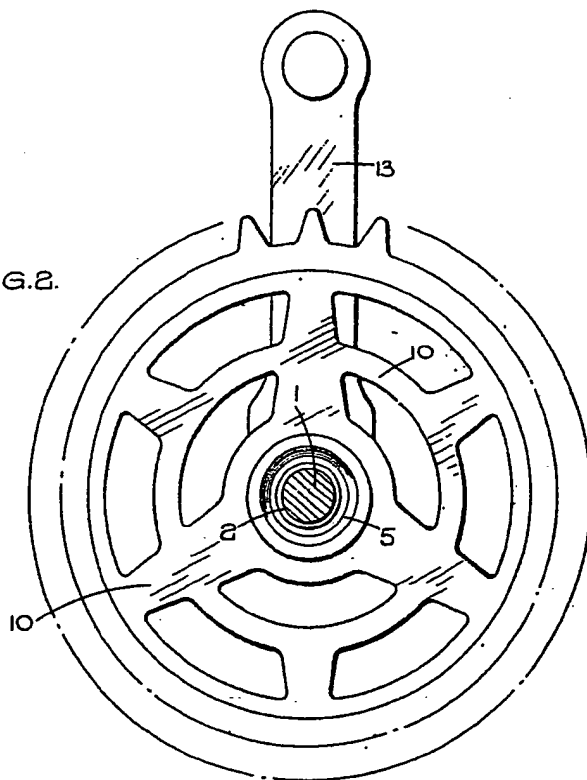
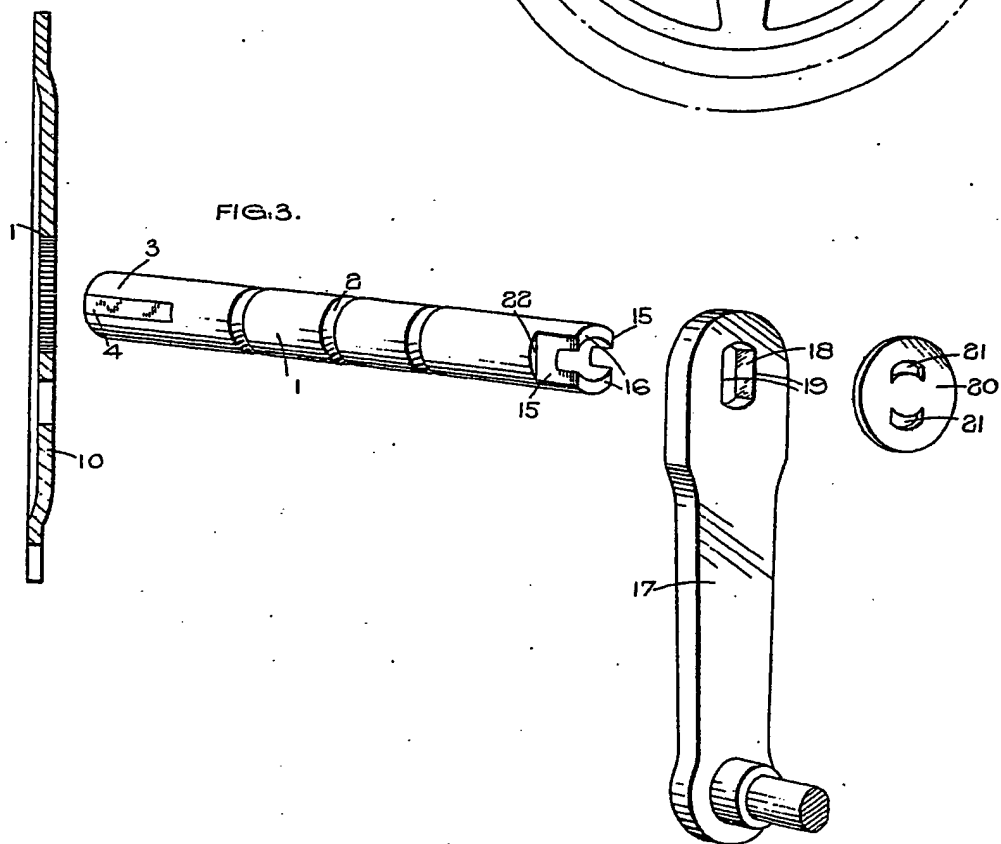


FIG. 3.



356,497 COMPLETE SPECIFICATION

[This Drawing is a reproduction of the Original on a reduced scale]

